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Paper Authors

DR SVB SUBRAHMANYESWARARAO, DR KV SUBRAMANIAN

Ramachandra College of Engineering

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PROPERTIES OF FUZZY MAGNIFIED$-\alpha-$ TRANSLATION ON PS-ALGEBRAS

***DR SVB SUBRAHMANYESWARARAO, DR KV SUBRAMANIAN**
[1,2]Professor, Ramachandra College of Engineering, Eluru
[1]manyam4463@gmail.com, [2]kvs42421@gmail.com

Abstract- In this paper, we define a fuzzy magnified $-\alpha-$translation on PS-algebras and some relationsare discussed by using fuzzy PS-ideal and fuzzy PS-sub algebra concepts.
Keywords-Fuzzy magnified$-\alpha-$translation, Fuzzy PS-ideal, Fuzzy PS-Sub Algebra
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I.INTRODUCTION

Fuzzy set concept was introduced by Zadeh.L.A.Fuzzy set has significant impact over the field of mathematical research having wide range of applications in Mathematics and related areas.W.B. VasanthaKandasamy introduced the concept of fuzzy translation and fuzzy multiplication. S.K. Majumder, S.K.Sardar introduced the idea of fuzzy magnified translation in a gamma semigroup.Later T.Priya and T.Ramachandranintroduced Fuzzy $-\alpha-$translation and Fuzzy$-\alpha-$multiplication.In this paper, we introduce Fuzzy magnified$-\alpha-$translation of Fuzzy PS-Algebras and we discuss some properties of Fuzzy magnified$-\alpha-$translation of Fuzzy PS-Algebras.

II. PRELIMINARIES

Definition 2.1. Let $G = \{x, y, z, \ldots.\}$and$\Gamma = \{\alpha, \beta, \gamma, \ldots\}$ be two nonempty sets. Then G is called $\Gamma-$semigroup if it satisfies (i) $x\gamma y \in G$ (ii) $(x\beta y)\gamma z = x\beta(y\gamma z) \forall\, x, y, z \in G$ and $\beta, \gamma \in \Gamma$

Definition 2.2. A fuzzy subset of a non empty set X is a function $\mu: X \longrightarrow [0,1]$

Definition 2.3. Let μ be a fuzzy subset of a set X and $\alpha \in [0,1 - \sup\{\mu(x): x \in X\}]$.A mapping $\mu_\alpha{}^T: X \longrightarrow [0,1]$ is called a fuzzy translation of μ if $\mu_\alpha{}^T(x) = \mu(x) + \alpha, \forall x \in X$

Definition 2.4. Let μ be a fuzzy subset of a set X and $\beta \in [0,1]$. A mapping $\mu_\beta{}^M: X \longrightarrow [0,1]$ is called a fuzzy multiplication of μ if $\mu_\beta{}^M(x) = \beta.\mu(x), \forall x \in X$

Definition 2.5. Let μ be a fuzzy subset of a set X and $\alpha \in [0,1 - \sup\{\mu(x): x \in X\}]$ and $\beta \in [0,1]$.A mapping $\mu_{\beta\alpha}{}^C: X \longrightarrow [0,1]$ is called a fuzzy magnified$-\alpha-$translation of μ if $\mu_{\beta\alpha}{}^C(x) = \beta.\mu(x) + \alpha, \forall x \in X$

Definition 2.6. Let S be a nonempty subset of a PS- algebra X, then S is called a PS-sub algebra of X if x*y∈ S for all x,y∈ S

Definition 2.7. Let X be a PS-algebra and I be a subset of X, then I is called a PS-ideal of X if it satisfies the following conditions:
(i) $0 \in I$ (ii) $y * x \in I$ and $y \in I \Rightarrow x \in I$

III.FUZZY MAGNIFIED$-\alpha-$TRANSLATION IN PS-ALGEBRA

Let X be a PS-algebra. Let μ be a fuzzy subset of X and $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$

Definition 3.1. Let μ be a fuzzy subset of X and $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$. A mapping $\mu_\alpha{}^T: X \longrightarrow [0,1]$ is called a fuzzy- $\alpha-$translation of μ if $\mu_\alpha{}^T(x) = \mu(x) + \alpha, \forall x \in X$

Definition 3.2. Let μ be a fuzzy subset of X and $\alpha \in [0,1]$.A mapping $\mu_\alpha{}^M: X \longrightarrow [0,1]$ is called a fuzzy- α -multiplication of μ if $\mu_\alpha{}^M(x) = \alpha\,\mu(x), \forall x \in X$

Definition 3.3. Let μ be a fuzzy subset of a set X and $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$ and $\beta \in [0,1]$.A mapping $\mu_{\beta\alpha}{}^C: X \longrightarrow [0,1]$ is called a fuzzy magnified$-\alpha-$translation of μ if $\mu_{\beta\alpha}{}^C(x) = \beta.\mu(x) + \alpha, \forall x \in X$

Theorem 3.4.

Let X be a PS-algebra. If μ of X is a fuzzy PS-sub algebra and $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$, then the fuzzy magnified$-\alpha-$translation $\mu_{\beta\alpha}{}^C(x)$of μ is also a fuzzy PS-sub algebra of X.

Proof: Let $x, y \in X$ and $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$

Then $\mu(x*y) \geq \min\{\mu(x),\mu(y)\}, \forall x, y \in X$

Now $\mu_{\beta\alpha}{}^C(x*y) = \beta.\mu(x*y) + \alpha$

$$\geq \beta \min\{\mu(x),\mu(y)\} + \alpha$$
$$= \min\{\beta.\mu(x) + \alpha,\ \beta.\mu(y) + \alpha\}$$
$$= \min\left\{\mu_{\beta\alpha}{}^C(x), \mu_{\beta\alpha}{}^C(y)\right\}$$

Hence $\mu_{\beta\alpha}{}^C$ of μ is a fuzzy PS-sub algebra of X.

Theorem 3.5.

Let X be a PS-algebra. If the fuzzy magnified$-\alpha-$translation $\mu_{\beta\alpha}{}^C(x)$of μ is a fuzzy sub algebra of X, then μ is a fuzzy sub algebra of X.

Proof:

Suppose that $\mu_{\beta\alpha}{}^C(x)$ is a fuzzy sub algebra of X for some $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$

Let $x, y \in X$. Now$\beta.\mu(x*y) + \alpha = \mu_{\beta\alpha}{}^C(x*y)$

$$\geq \min\left\{\mu_{\beta\alpha}{}^C(x), \mu_{\beta\alpha}{}^C(y)\right\}$$
$$= \min\{\beta.\mu(x) + \alpha,\ \beta.\mu(y) + \alpha\}$$
$$= \beta \min\{\mu(x),\mu(y)\} + \alpha$$

$\Rightarrow\ \mu(x*y) \geq \min\{\mu(x),\mu(y)\}, \forall x, y \in X.$

Hence μ is a fuzzy sub algebra of X.

Theorem 3.6.

Let X be a PS-algebra .If the fuzzy magnified$-\alpha-$translation $\mu_{\beta\alpha}{}^C(x)$of μ is a fuzzy PS-ideal, then $\mu_{\beta\alpha}{}^C\big(x*(y*x)\big) \geq \mu_{\beta\alpha}{}^C(y)$.

Proof:

$$\mu_{\beta\alpha}{}^C\big(x*(y*x)\big) = \beta.\mu(x*(y*x)) + \alpha$$
$$\geq \beta.\min\left\{\mu\Big(y*\big(x*(y*x)\big)\Big) + \alpha, \mu(y) + \alpha\right\}$$
$$= \min\{\beta.\mu(0) + \alpha,\quad \beta.\mu(y) + \alpha\}$$
$$\geq \min\left\{\mu_{\beta\alpha}{}^C(0),\ \mu_{\beta\alpha}{}^C(y)\right\}$$
$$= \mu_{\beta\alpha}{}^C(y)$$

Theorem 3.7. If μ is a fuzzy PS-ideal of a fuzzy PS-algebra X, then the fuzzy magnified$-\alpha-$translation $\mu_{\beta\alpha}{}^C(x)$of μ is a fuzzy PS-ideal of X, $\forall \alpha \in [0,1-\sup\{\mu(x): x \in X\}]$.

Proof:

Let μ be a fuzzy PS-ideal of X and let $\alpha \in [0,1-\sup\{\mu(x): x \in X\}]$

Now $\mu_{\beta\alpha}{}^C(0) = \beta.\mu(0) + \alpha$

$$\geq \beta.\mu(x) + \alpha$$
$$= \mu_{\beta\alpha}{}^C(x)$$

Therefore $\mu_{\beta\alpha}{}^{C}(0) \geq \mu_{\beta\alpha}{}^{C}(x)$

Again $\mu_{\beta\alpha}{}^{C}(x) = \beta.\mu(x) + \alpha$

$$\geq \beta.\min\{\mu(y * x), \mu(y)\} + \alpha$$
$$= \min\{\beta\,\mu(y * x) + \alpha,\ \beta\,\mu(y) + \alpha\}$$
$$= \min\left\{\mu_{\beta\alpha}{}^{C}(y * x), \mu_{\beta\alpha}{}^{C}(y)\right\}$$

Hence $\mu_{\beta\alpha}{}^{C}$ of μ is a fuzzy PS-ideal of X.

Theorem 3.8. If the fuzzy magnified$-\alpha-$translation $\mu_{\beta\alpha}{}^{C}(x)$ of μ is a fuzzy PS-ideal of a PS-algebra X, for some $\alpha \in [0,1 - \sup\{\mu(x): x \in X\}]$, then μ is a fuzzy PS-ideal of X.

Proof:

Suppose that $\mu_{\beta\alpha}{}^{C}$ of μ is a fuzzy PS-ideal of X for some $\alpha \in [0,1 - \sup\{\mu(x): x \in X\}]$

Let $x, y \in X$. Then $\beta.\mu(0) + \alpha = \mu_{\beta\alpha}{}^{C}(0)$

$$\geq \mu_{\beta\alpha}{}^{C}(x)$$
$$= \beta.\mu(x) + \alpha$$

Hence $\mu(0) \geq \mu(x)$

Again $\beta.\mu(x) + \alpha = \mu_{\beta\alpha}{}^{C}(x)$

$$\geq \min\left\{\mu_{\beta\alpha}{}^{C}(y * x), \mu_{\beta\alpha}{}^{C}(y)\right\}$$
$$= \min\{\beta\,\mu(y * x) + \alpha,\ \beta\,\mu(y) + \alpha\}$$
$$= \beta.\min\{\mu(y * x), \mu(y)\} + \alpha$$

Therefore $\mu(x) \geq \min\{\mu(y * x), \mu(y)\}$, so μ is a fuzzy PS-ideal of X

Theorem 3.9.

The union and intersection of any two fuzzy magnified$-\alpha-$translations of a fuzzy PS-ideal μ of a PS-algebra X is also a fuzzy PS-ideal of X.

Proof:

Let $\mu_{\beta\alpha}{}^{C}$ and $\mu_{\delta\alpha}{}^{C}$ be two fuzzy magnified$-\alpha-$translations of a fuzzy PS-ideal μ of a PS-algebra X, where $\beta, \delta \in [0,1 - \sup\{\mu(x): x \in X\}]$

Assume that $\beta \leq \delta$. By theorem 3.7, both $\mu_{\beta\alpha}{}^{C}$ and $\mu_{\delta\alpha}{}^{C}$ are fuzzy PS-ideals of X.

Now

$$(\mu_{\beta\alpha}{}^{C} \cap \mu_{\delta\alpha}{}^{C})\ (x) = \min\left\{(\mu_{\beta\alpha}{}^{C}(x), \mu_{\delta\alpha}{}^{C}(x)\right\}$$
$$= \min\{\beta\mu(x) + \alpha, \delta\mu(x) + \alpha\}$$
$$= \beta\mu(x) + \alpha$$
$$= \mu_{\beta\alpha}{}^{C}(x)$$

Again $(\mu_{\beta\alpha}{}^{C} \cup \mu_{\delta\alpha}{}^{C})\ (x) = \mu_{\delta\alpha}{}^{C}(x)$

Therefore $\mu_{\beta\alpha}{}^{C} \cup \mu_{\delta\alpha}{}^{C}$ and $\mu_{\beta\alpha}{}^{C} \cap \mu_{\delta\alpha}{}^{C}$ are fuzzy PS-ideals of X.

IV.CONCLUSION

In this paper the author discussed fuzzy magnified$-\alpha-$translations on PS-algebra and their properties. The concept can further be extended to gamma semigroups, partially ordered gamma semigroups. These structures are useful in solving many uncertainty problems in decision making.

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